

X. Success Stories

Partnerships between the Department and many private and public organizations has resulted in several dramatic improvements in water quality throughout the state. In fact, 63 water body segments that were listed in the 1998 303(d) list have been proposed for removal from the 2002 303(d) List based on improved water quality. A few of these improved streams are highlighted below.

A. Pigeon River

In April 1989, the State of Tennessee issued a “do not consume” advisory on all fish in the Pigeon River due to dioxin contamination. The advisory covered the river from the North Carolina-Tennessee state-line downstream to the mouth on the French Broad River (Douglas Reservoir). Dioxin levels in fish tissue samples exceeded the 5 part per trillion (ppt) posting trigger. The source of the contamination was the Champion Paper Mill in Canton, North Carolina. Since that time, the paper mill has changed ownership (Blue Ridge Paper). Since the original advisory was posted, the plant has improved pollution control practices.



Fish collected from the Pigeon River for tissue analysis are obtained by a combination of backpack shocking (pictured), boat shocking, seining and gill netting. (Photo provided by Jonathon Burr, KEAC.)

Fish tissue data collected between 1989 and 1995 demonstrated a drop in dioxin contamination with some species exhibiting safe levels. In March 1996, the advisory for the Tennessee portion of the river was downgraded to a “precautionary advisory” for redbreast sunfish, carp and catfish.

Fish tissue samples have continued to be collected at three sites on the Pigeon River over the last seven years. The three species on the advisory, as well as additional game and rough fish species, have been analyzed for dioxin. Game fish and rough fish have consistently been below 1 ppt. Catfish are generally higher but consistently fall below 2 ppt. None of the fish samples has exceeded the 5 ppt advisory level during this period.



The Pigeon River in East Tennessee. (Photo by Jonathon Burr, KEAC.)

Based on the data collected since 1996, it appears that the fish in the Pigeon River are safe to eat at normal consumption rates (Denton and Arnwine, 2002). The Division of Water Pollution Control is recommending that the Tennessee segment of the river be de-posted for fish consumption. North Carolina, which has a dioxin posting limit of 3 ppt, removed their consumption advisory on the Pigeon River in August 2001.



(l to r) Roland Dykes, Mayor of Newport; Paul Davis, Water Pollution Control director; Justin P. Wilson, Deputy to the Governor for Policy; and Iliff McMahan, Cocke County Executive recently participated in an informal celebration of the removal of the fish consumption advisory signs on the Pigeon River. (Photo provided by Melanie Catania, Environmental Policy Office.)

B. Arkansas Creek

Arkansas Creek, a South Harpeth River tributary in the Harpeth River watershed (TN05130204), flows near the Williamson County Landfill. In 1998, Arkansas Creek was placed on the 303(d) list of impacted streams in Tennessee for inorganic pollution, habitat alteration, siltation, and organic enrichment. The primary source of the pollutants was considered to be the landfill.

The same year a new manager, Mr. Lewis Bumpus, was hired to oversee Williamson County's solid waste management program, including the landfill. A plan to restore Arkansas Creek was developed with the goals to restore the stream and protect it from future pollution impacts (Civil & Environmental Consultants, Inc. 2001).



Placement of gabion (rock baskets) to prevent runoff from the Williamson County Landfill site. (Photo provided by Jeff Duke, Civil & Environmental Consultants, Inc.)

The objectives of the Arkansas Creek stream restoration plan were:

1. Introduce aquatic habitat-enhancing structures.
2. Maximize silt capture.
3. Utilize biotechnical methods for stabilizing stream banks and bedload.
4. Introduce specific vegetation types to attract wildlife and enhance stabilization.
5. Continue to implement Best Management Practices (BMPs) related to landfill operation to prevent future siltation.
6. Document the water quality and biological integrity of area streams.



The constructed wetland at the base of the gabion spillway below the Williamson County Landfill. Just like their natural counterparts, constructed wetlands filter pollutants and help retain waters. (Photo provided by Jeff Duke, Civil & Environmental Consultants, Inc.)

After site mitigation was completed, an environmental consultant was hired to survey area streams. The consultant collected biological samples in Arkansas Creek and Kelly Creek in the fall of 2000. Arkansas Creek passed TDEC's proposed biological criteria for subcoregion 71f.

In 2001, TDEC staff collected biological samples at two locations downstream of the landfill on Arkansas Creek. Both sites passed biological and habitat guidelines for this ecoregion. Since this creek is supporting a healthy biological community it has been removed from the 2002 303(d) List.

C. Cumberland River

The Metropolitan Government of Nashville and Davidson County Water and Sewerage Services (Metro Water Services) began an Overflow Abatement Program (OAP) in 1990 to comply with the TDEC Commissioner's Order. Over the next decade, Metro invested \$685 million in its sewage treatment system. The annual wastewater overflow into the Cumberland River was reduced from 20 billion gallons in 1990 to less than one billion in 2001. Seventy-six percent of sewer overflows from manholes and pump stations have been eliminated and pump station overflows have been reduced by 94 percent.



Water quality in the Cumberland River has improved due to dramatic reductions in sewage overflows. Bill Purcell, Mayor of Nashville, and Governor Don Sundquist joined in the removal of the pathogen advisory on this segment of the Cumberland River in Nashville. (Photo provided by Jed DeKalb, Chief State Photographer.)

Metro Water Services has submitted plans through 2007 for continuing improvement to the quality of water discharged into the Cumberland River. Metro Water Services also plans to spend another 125 million dollars to improve wastewater quality. This effort has resulted in all of the Cumberland River in Davidson County except the portion between the Bordeaux Bridge and the Woodland Street Bridge being removed from the 2002 303(d) List. If the water quality continues to improve, soon this portion of the Cumberland River and several other creeks in the Cheatham Reservoir watershed will have their water contact advisories lifted.

D. Middle Fork Drakes Creek

Prior to 1920, a wildcat oil well was drilled on the bank of Middle Fork Drakes Creek in the Barren River Watershed (TN05110002). The well never produced any oil but instead, tapped into a sulfur deposit. For the last 80 years this artesian spring has discharged noxious metal laden sulfur water into the creek. A cone of mineral deposits had built up around the mouth of the spring until it resembled a miniature volcano with sulfur water emerging clear, then turning black when it came in contact with the air. Several efforts to cap the spring had failed.



A crewman oversees the drilling process to prepare to cap the artesian well spewing sulphur and other metals into the Middle Fork of Drakes Creek. The “volcanic cone” of precipitated metals can be seen to the right of the rig. (Photo provided by Joe Holland, Nashville EAC.)

Without a responsible party it was difficult to fund remediation. A fine collected from another environmental enforcement action was earmarked for environmental cleanup. This money was used to hire a company to permanently cap this well and stop the noxious discharge. The stream has recovered remarkably since the artesian spring has been capped. Middle Fork Drakes Creek has been removed from the 2002 303(d) List. Due to the documented improvement in this section of the creek, for the first time the State of Tennessee has assessed it as fully supporting its designated uses.

E. French Broad River

The French Broad River, one of the two main tributaries that forms the Tennessee River above Knoxville, originates in the Blue Ridge Mountains of southwestern North Carolina. It flows past the city of Asheville, North Carolina on its way to the Unaka Mountains. It enters Tennessee east of Newport.



The beautiful French Broad River as seen from the Appalachian Trail near Hot Springs, North Carolina. (Photo by Lee Keck, Division of Water Supply.)

The Division has maintained a long-term monitoring station near the town of Del Rio. Chemical sampling in years past indicated an elevated bedload of sediment, along with occasional violations of metals criteria. Color levels were also considered elevated. Biological monitoring indicated that the river did not meet Tennessee's goals for biological integrity.

In 2001, the Division performed biorecon surveys at two sites on the upper French Broad. Survey results are summarized on the next page. Additionally, there were no water quality standards violations noted from the chemical data collected near Del Rio. Due to the documented improvement in this section of the French Broad River, the State of Tennessee has assessed it as fully supporting its designated uses.

2001 Biological Survey Results French Broad River

<u>Station</u>	<u>River Mile</u>	<u>EPT Genera</u>	<u>Intolerant Genera</u>	<u>Total Genera</u>	<u>Habitat Score</u>
Boyers Island	77.5	19	7	38	155
Near NC Stateline	95.9	19	7	47	155

F. Ocoee River

The Ocoee River in southeastern Tennessee has never been considered to support its designated uses due to a 150-year history of environmental damage in the Copper Basin.

In the mid-1970's, a biological survey was undertaken in the Ocoee River downstream of the industrial complex at Copperhill, Tennessee. Biologists found only one living thing in the stream, an insect. They debated over whether the bug actually lived in the river, or had simply fallen off a nearby railroad trestle.

Much has changed in this section of the river since then. In 1998, TVA biologists surveyed the Ocoee in the same area as the 1970s study (mile 35.1). They documented dramatic improvements in the quantity and diversity of macrobenthic aquatic life, including 11 EPT families. 18 total families were noted.

In 2001, TVA biologists returned to the same site. This time, 13 EPT families were collected, including nine families considered intolerant to pollution. The total number of macrobenthic families increased from 11 in 1998, to 28 in 2001. The site easily passed the Division's stringent biological integrity goals for that ecoregion.

The improvement in water quality in the Ocoee River near Copperhill can be traced to numerous factors:

- The revegetation of the Copper Basin. Historical copper smelting activities in the 1800's and early 1900's had led to several thousand acres of denuded land in the area. A partnership of multiple agencies, including the state of Tennessee, had been busy planting trees for the last 25 years. Most of the Copper Basin is now reforested.
- Industrial discharges. Industrial discharges to Davis Mill Creek and the Ocoee have practically ceased. Occasional spills still remain a concern.



*The Ocoee River near Copperhill, Tennessee.
(Photo by Andy Binford, Division of Superfund.)*

- CERCLA activities. Water quality in North Potato Creek and its tributary, Burra Burra Creek have improved due to the cleanup of waste sites. Much work remains to be done in these tributaries before water quality goals will be completely met, but the transport of pollutants to the Ocoee from these tributaries appear to have diminished in intensity.
- Performance of the Copperhill STP. An upgrade of this facility is underway. However, the plant appears to be better operated than in the past, when it consistently violated its permit limits.

In the fall and winter of 2002-2003, chemical and biological sampling in the Ocoee downstream of North Potato Creek revealed that water quality standards continue to be violated. Several tributaries, including North Potato Creek and Davis Mill Creek, apparently continue to discharge pollutants into the Ocoee River in toxic amounts.

There is little doubt that the water quality in the Ocoee River directly downstream of the Copper Basin has improved. While still not clean enough to be considered unimpaired, the documented improvements certainly lend credence to the belief that continued efforts to mitigate past environmental harms will result in additional water quality improvements.

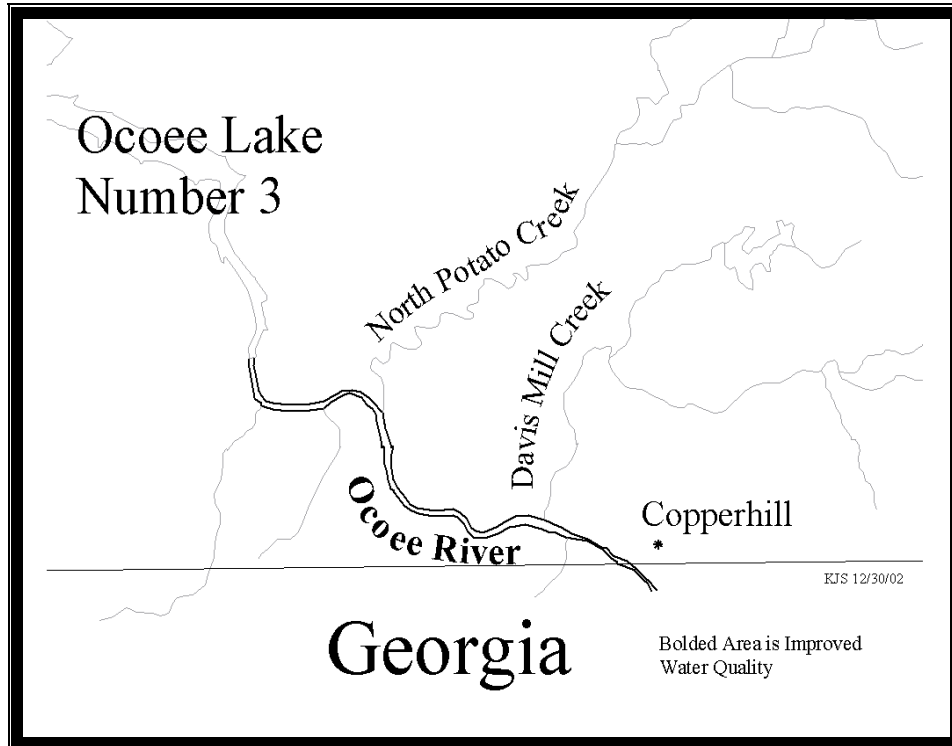


Figure 19. Location of Section With Improved Water Quality on the Ocoee River (improved section bolded).

G. Sinking Creek

It was discovered in 2001 that untreated sewage was entering Sinking Creek, a small tributary to Barton's Creek in Wilson County (TN05130201). The sewage originated from businesses near the historic downtown district of Lebanon. These businesses had never been properly connected to the sanitary sewer.

Downstream from the square, Sinking Creek flows through a large city park frequented by children. Due to the obvious threat to public health a stream advisory was posted for no water contact. Local officials began working to correct the problems that led to the advisory.

Since the original posting, the businesses on the town square have been connected to the sanitary sewer. In December of 2002, the water contact advisory was lifted.

H. Trail Fork Big Creek

Following a Hepatitis A outbreak in 1995, a water contact advisory was placed on Trail Fork Big Creek and five of its tributaries in the Upper French Broad watershed (TN06010105). Because viruses cannot be detected in water, TDEC performed an intensive survey using fecal coliform and *E. coli* as indicators of pathogens. The survey indicated that several streams in the watershed had elevated pathogens counts. The source of the pathogens was thought to be failing septic systems.

In addition to monitoring streams and wells, Department staff and the local county health department personnel worked with local residents to upgrade failing septic tanks to remove the source of the bacteria. The results of recent bacteria testing over the course of several years indicate that the state's water quality standards are now being met in most of these streams.

In December of 2002, the water contact advisory was formally removed from several streams in the Trail Fork Big Creek watershed. The stream sections deposted were: the downstream portion of Trail Fork Big Creek, the upstream portion of Johns Creek, Black Creek, Bear Branch, and Dry Fork Big Creek. The Division will continue to monitor all these streams, but particularly Baker Creek and the downstream section of Johns Creek, which remained posted.

I. Doe River

The Doe River is a high quality stream that originates near Roane Mountain in northeastern Tennessee. Within Roane Mountain State Park, it is sampled as a reference stream for subcoregion 66d.

In 1998, downstream portions of the Doe River and Laurel Fork, a tributary near Hampton that is also a reference stream, were dredged and channelized without authorization following a flood event. TDEC in a joint effort with Natural Resource Conservation Service (NRCS), U.S. Army Corps of Engineers (USACE), and Tennessee Wildlife Resources Agency (TWRA) helped stabilize the raw banks. Several stabilization methods including bioengineering, gabion baskets, and matting were used to help repair the stream bank. These stabilization efforts combined with little development upstream of the disturbance has provided for quick recovery of these high gradient streams.

In 2001 TVA conducted a biological survey in the Doe River and Laurel Fork and found the biological community to be healthy. Subsequently TDEC personnel preformed biological surveys on both locations and found them to be fully supporting of aquatic life. The biological communities at both of these streams appear to have recovered well.